What is VOIP?

- VOIP is a next-generation protocol that delivers voice via IP Internet Protocol (IP) instead of Time Division Multiplexing (TDM). The public switched network telephone network (PSTN) is a hybrid, using both.
- Applications include
  - computer-to-computer
  - computer-to-phone
  - phone-to-computer
  - phone-to-phone

How does VOIP work?

- The VOIP carrier supplies a telephone number and a network translator device.
- The customer speaks into a telephone or computer microphone.
- The customer’s voice is encoded by the network translator device into packets and transmitted over the broadband connection.

How do ‘packets’ fit in?

- The voice packets are routed within the customer’s intranet (LAN or WAN) or to the PSTN, or
- Voice packets are sent through the Internet to the VOIP carrier’s facilities and transmitted to the PSTN.

What is packet switched protocol conversion?

- The voice signal is broken down into milliseconds of binary data, each consisting of three segments:
  - Header — with control information,
  - Payload — containing the actual transmitted information, and
  - Trailer — signaling the end of the packet.
- Packet travel independently in different routes across the Internet and are reassembled into a message at the end point.
- Transmission quality and reliability are degraded if packets are lost or arrive out of sequence.
- Service quality is on par with cellular telephone service.

Impact of IP Telephony on Universal Service Programs Looking Ahead Five Years to 2008

- Total impact on programs projected to be $183 to $407 million by 2008.
- Providers such as Vonage, 8X8, and Telverse entering the residential market now impact the public purpose programs by about $9 million in 2008. Continuing conversions of business lines by ILECs impact the programs then by about $174 million.
- Cable providers and ILECS entering the residential market in 2005, a date described as more likely by cable providers and ILECs, impact the funds by about $198 million in 2008. Continuing conversions of business lines by ILECs impact the programs then by about $174 million.
- Cable providers and ILECS entering the residential market in 2004, a date described as more likely by financial analysts, impact the funds by about $216 million in 2008. Continuing conversions of business lines by ILECs impact the programs then by about $174 million.
- Basic Assumptions
  - No change in the number of effective residential or business access lines
  - Based on industry and financial community sources, penetration rates are 10% for cable, 10% for ILEC business, and 5% for ILEC residential.

Impact of IP Telephony on Universal Service Programs

Projected Dollar Impact by Fund in 2008
($Million)

Subsidy Program	FY 03-04 Appropriation	2008 VOIP Impact
Total	$939	$183 to $407
• California High Cost Fund A (small LECs)	$ 62	$12 to $27
• California High Cost Fund B (large LECs)	$522	$102 to $226
• Universal Lifeline Fund (Lifeline discount)	$246	$48 to $107
• Deaf & Disabled Telecommunications Fund (DDTP)	$ 69	$13 to $30
• California Teleconnect Fund (schools, community based organizations, libraries)	$ 40	$ 8 to $17

Note: The lower estimate of the impact occurs if providers are limited to Vonage capturing residential customers and ILECs converting business customers. The larger impact occurs if cable providers and ILECs enter the residential market as well.

What the Market Leaders are Doing Now

- RBOCs, AT&T, MCI and Global Crossing - routinely use IP packet switching in long-haul networks - it is inherently more economic than circuit switching. So do wireless carriers.
- RBOCs - SBC, Bellsouth – began actively in 2002 to migrate business PBX customers under intrastate tariffs to IP telephony services. Qwest announced plans to offer VOIP in Minnesota.
- Regional carriers – Frontier and Citizens – describe

  "an enormous economic incentive to follow the same path…would offer…customers CPE that makes a voice-to-IP conversion and replace…circuit switches with IP-based packet switches as quickly as possible… would not charge sales taxes or 911 fees and would no longer devote the resources needed to comply with CALEA…would stop contributing to the Universal Service Fund... Every other telecommunications carrier would have no reasonable economic choice but to do the same.
  Source: Comments of the Frontier and Citizens Telephone Companies, In the Matter of Vonage Holdings Corporation WC Docket No. 03-211 Petition for Declaratory Ruling Concerning an Order of the Minnesota Public Utilities Commission, pp. 11-12
- AT&T is testing VOIP with customers now through February, 2004. Source: AT&T website.
- MCI moves 10% of calls over its IP backbone now, expects 25% by the end of 2003 and 100% by the end of 2004.

  Source: Interview with Vinton Cerf ('father of internet'), MCI VP, CNET News.com, September 10, 2003.

Cable IP Telephony

- Cablevision this Tuesday began offering unlimited local, regional and long distance VOIP service with five custom-calling features system-wide, including full-function E911, for $34.95 per month. It serves over one million "Optimum Voice" customers, compared to 507,000 at the end of 2001. Three-fourths of Cablevision's broadband customers and over 23% of all potential customers have signed up. It has 4.4 million customers in Connecticut, New Jersey, Long Island, Westchester and New York City. Source: Cablevision press release, November 11, 2003
- Comcast, Cox and Time Warner – more cautiously - are pilot testing VOIP. Analysts say these companies will begin to offer retail VOIP services in 2004 to 2005.
- Industry experts say in 2 to 3 years after a cable company begins offering VOIP, 20% to 30% of its customers will have made the switch. Source: CLEC technical expert in meeting with TD staff, October 9, 2003.

Business is Migrating to IP telephony

- IBM is converting and Cisco has converted their enterprise systems to IP telephony.
- Avaya's print ads offer to convert an enterprise's legacy telephone system to IP while retaining 85% of its embedded investment. Source: Wall Street Journal, October 30, 2003, p. A11.
  - –Avaya was spun off from Lucent in 2000. It competes with Cisco.
- Nemertes Research recently (2003) surveyed 42 large companies on IP telephony use
  - –62% use it now
  - –19% are running trials of it
  - –The rest plan to implement it in 1-2 years

  Source: Nemertes Research, (in) "VOIP by the Numbers", Network World Fusion (nwfusion.com), November 3, 2003.
- 10 percent of business systems have been replaced with a form of VOIP. Source: Washington Post, "Is it Phone or Internet…?", October 26, 2003.
- VOIP equipment accounted for 46% of US enterprise telephone systems sales in 2002, up from 24% in 2001.

  Source: In-Stat/MDR, from "Has VOIP's Time Arrived…?" The Globe and Mail, May 21, 2003, on net2phone.com website.

Replies to the CPUC's Letter Assert

- Jurisdiction is not CPUC, because
  - Service is information, not telecommunications
  - Protocol conversion (computer process/packetizing) changes or enhances the communication
  - Voice functionality is only one of many service elements in package
- Other observations
  - VOIP is an infant industry, so it should not be regulated
  - Requested extensions of time to reply
  - Offered to work with Commission and agency staff
  - CPUC should open a public inquiry, workshop, rulemaking, evidentiary hearing (after jurisdiction is established)

IP Telephony does not do the following

- Contribute to
  - California High Cost Fund A (small LEC subsidies)
  - California High Cost Fund B (large LEC subsidies)
  - Universal Lifeline Fund (Lifeline household discount)
  - Deaf & Disabled Telecommunications Fund
  - California Teleconnect Fund (schools, community based organizations, libraries)
- Provide E911 service
- Pay access charges
- Provide access to traffic for law enforcement
- Obtain telephone numbers under the North American Numbering Plan

Million California Broadband Customers (Includes, DSL, Cable, Other)								**Documentation, Comments,**
base year								
2002	2003	2004	2005	2006	2007	2008	% growth rate	
3.0	3.8	4.7	5.9	7.4	9.3	11.6	25	Base year level from FCC report on CA broadband subscribers
3.0	4.6	6.8	10.2	15.4	23.0	34.6	50	Growth rates developed from CPUC 3rd Report on Broadband (in draft)
								49% DSL, 39% Cable, 12% other, CPUC 3rd report on broadband
								yearly customer growth
3.0	3.8	4.6	5.4	6.2	7.0	7.8	800,000	Observed growth rates. Source: CPUC 3rd Report on Broadband (in draft)
3.0	4.0	5.0	6.0	7.0	8.0	9.0	1,000,000	SBC describing its own capacity. Bus. Comm. Review, June, 2000, pp. 14-16.
								SBC install rate does not include "G.Lite", or customer-installed systems.
Scenario 1: No Market Entry by ILECs or Cable Providers								
California VOIP Customers with No Cable or DSL Conversion (Broadband and Industry growth rates)								
base year								
	2003	2004	2005	2006	2007	2008	% growth rate	
	30,000	37,500	46,875	58,594	73,242	91,553	25	Base year: see Estimation of California VOIP Users, below
	30,000	45,000	67,500	101,250	151,875	227,813	50	VOIP uptake directly proportional to broadband growth; or, 1 percent of broadband users are VOIP users
	30,000	60,000	120,000	240,000	480,000	960,000	100	Growth rate verbal estimate from industry source November 6, 2003.
VOIP % penetration at growth rate								
25	0.2%	0.3%	0.3%	0.4%	0.5%	0.6%		
50	0.2%	0.3%	0.5%	0.7%	1.0%	1.6%		
100	0.2%	0.4%	0.8%	1.6%	3.3%	6.6%		

Scenario 2: Residential Market Entry by Cable Providers and ILECs in 2004								
Conversion of California Cable customers to VOIP (millions)								
	2003	2004	2005	2006	2007	2008	% conversion rate to VOIP	Base year: total cable homes California. CA Cable & Telecom Assn, 2003 Western Show Announces…, 4/29/03.
	7.1	0.46	1.0	1.6	2.3	3.1	10	Conversion Rate: I65 Conversion applied to smallest of projected number of broadband customers. Rate compares with long distance capture rate by SBC in California market.
Cable % VOIP penetration		3%	7%	11%	16%	21%		
Conversion of California Large ILEC Residential Line Customers to VOIP (millions)								
switched access lines								
2002	2003	2004	2005	2006	2007	2008	% conversion rate to VOIP	
15.2	14.6	13.4	12.3	11.1	9.8	8.6	5	Base year: CPUC data request for 3rd Report on Broadband; ILEC lose 4% access lines in 2003
ILEC Residential VOIP Lines (millions)								ILECs convert DSL and DSL-capable lines.
		0.71	1.3	1.9	2.4	2.9		Conversion rate: total conversion rate to internet telephony is 7.5 percent per year, NJ.com (Star-Ledger) Making the call…, November 2, 2003, in a report from Atlantic-ACM, a Boston-based consultant. ILEC conversion rate is arithmetically one-half cable conversion rate.
ILEC % VOIP penetration		5%	9%	13%	17%	20%		
Residential VOIP% penetration		**8%**	**16%**	**24%**	**33%**	**41%**		
total effective residential lines	14.6	14.6	14.6	14.6	14.6	14.6		assumes no change in the number of residential access lines

Scenario 3: Residential Market Entry by Cable Providers and ILECs in 2005								
Conversion of California Cable customers to VOIP (millions)								
	2003	2004	2005	2006	2007	2008	% conversion rate to VOIP	Base year: total cable homes California. CA Cable & Telecom Assn, 2003 Western Show Announces…, 4/29/03.
	7.1	7.1	0.54	1.2	1.9	2.7	10	Conversion Rate: industry source, meeting with TD staff, October 9, 2003. Conversion applied to smallest of projected number of broadband customers. Rate compares with long distance capture rate by SBC in California market.
% VOIP penetration			4%	8%	13%	18%		
Conversion of California Large ILEC Residential Line Customers to VOIP (millions)								
switched access lines								
2002	2003	2004	2005	2006	2007	2008	% conversion rate to VOIP	
15.2	14.6	14.6	13.3	12.1	10.8	9.5	5	Base year: CPUC data request for 3rd Report on Broadband; ILEC lose 4% access lines in 2003
ILEC Residential VOIP Lines (millions)								ILECs convert DSL and DSL-capable lines.
			0.7	1.3	1.9	2.5		Conversion rate: total conversion rate to internet telephony is 7.5 percent per year, NJ.com (Star-Ledger) Making the call…, November 2, 2003, in a report from Atlantic-ACM, a Boston-based consultant. ILEC conversion rate is arithmetically one-half cable conversion rate.
ILEC % VOIP penetration			5%	9%	13%	17%		
Residential VOIP% penetration			**9%**	**17%**	**26%**	**35%**		
total effective residential lines	14.6	14.6	14.6	14.6	14.6	14.6		assumes no change in the number of residential access lines

On-Going Conversion of California Large ILEC Business Line Customers to VOIP (millions)								
switched access lines								
2002	2003	2004	2005	2006	2007	2008	% conversion rate to VOIP	
9.1	8.7	7.9	7.1	6.4	5.7	5.2	10	Base year for VOIP business use: 10 percent of business systems have been replaced with a form of VOIP. Washington Post, Is it Phone or Internet…, October 26, 2003. 10 percent of all US phone calls are VOIP. Source: CNET, Internet Phone Providers…, October 8, 2003
ILEC Business VOIP Lines (millions)								Conversion rate: same as cable rate
	0.91	1.8	2.6	3.3	3.9	4.5		
total business effective lines	9.6	9.6	9.6	9.6	9.6	9.6		
Business VOIP% penetration								
of business market	9%	18%	27%	34%	41%	47%		
of business and residential market	4%	7%	11%	14%	16%	18.5%		
total all effective lines	24.2	24.2	24.2	24.2	24.2	24.2		Includes base level of business VOIP lines, but no change in the number of 'effective' business access lines
	% VOIP penetration							
	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**residential**	
VOIP Provider Entry	**4%**	**8%**	**11%**	**14%**	**17%**	**19%**	**0.94%**	residential pct estimated using penetration middle value 1.6% for 2008
Cable & ILEC Entry 2005	**4%**	**8%**	**16%**	**24%**	**32%**	**40%**	**21%**	
Cable & ILEC Entry 2004	**4%**	**12%**	**20%**	**28%**	**36%**	**43%**	**23%**	

Conversion rates:								
Cable/Residential	10	percent						
ILEC/Residential	5.0	percent						
ILEC/Business	10	percent						
Assumption	No change in the number of effective residential or business access lines							
Estimation of California VOIP Users								
300,000	VOIP users in North America. Source: Net2Phone website, May 2003							
19.8	million broadband users in US. Source: Broadband Internet Access in OECD Countries:A Comparative Analysis, October 2003, Pacific. 4.							
3.7	million broadband users in Canada. Source: do							
23.5	total broadband users North America							
0.84	ratio of US to North American broadand users							
252,766	US voip users; ***use 250,000***							
250,000	number of US VOIP users. Source: CNET, California to Regulate VOIP Providers, September 30, 2003							
1.3%	percent of broadband users with VOIP; ***use 1 percent***							
30,350	VOIP users in California. ***Use 30,000 in 2003***							

Penetration of VOIP by Date

	Cumulative % VOIP penetration					
	2003	2004	2005	2006	2007	2008
VOIP Provider Entry	4%	8%	11%	14%	17%	19%
Cable & ILEC Entry 2005	4%	8%	16%	24%	32%	40%
Cable & ILEC Entry 2004	4%	12%	20%	28%	36%	43%

Conversion rates:

Cable/Residential	10	percent
ILEC/Residential	5	percent
ILEC/Business	10	percent

Assumption No change in the number of effective residential or business access lines

STATE OF CALIFORNIA GRAY DAVIS, *Governor*

PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE
SAN FRANCISCO, CA 94102-3298

September 22, 2003

Mr. Jeffrey Citron, CEO
Vonage Holdings Corporation
2147 Route 27
Edison, NJ 08817

Dear Mr. Citron:

Based on our monitoring of the telecommunications market and actions being taken by other state regulatory commissions, the Telecommunications Division concludes that your company, Vonage, is offering intrastate telecommunications service for profit in California without having received formal certification from this Commission to provide such service.

The provision and regulation of local telephone service is under the jurisdiction of the California Public Utilities Commission. Section 234 of the California Public Utilities Code defines a telephone corporation asevery corporation or person who owns, controls, or manages a telephone line for profit. Section 233 defines a telephone line as any asset used to facilitate telephone communication. Section 216 states that any telephone corporation that performs compensated service to any portion of the California public is a public utility. Section 1001 requires that a telephone corporation must first be certificated by the Commission to place a telephone line into service.

Please file an application with the Commission for authority to conduct business as a telecommunications utility no later than October 22, 2003. You will find details on how to accomplish this on the Commission's website at

http://www.cpuc.ca.gov/static/industry/telco/information+for+providing+service/index.htm

You may contact Richard Fish at 415-703-1923 for further information.

Yours truly,

John M. Leutza, Director
Telecommunications Division

Cc: William Ahern, Executive Director
Angela Minkin, Chief Administrative Law Judge
Randolph R. Wu, Chief Counsel

****

Note added for distribution:

This letter was also sent to

1. SBC IP Communications, Inc.
2. Telverse Communications
3. Net2phone
4. 8X8, Inc.
5. VoicePulse